the smallest experience, perhaps with the smallest memory of what he was and what his school fellows were at the age of seventeen or eighteen, can make, to know that the master of the dead languages of a kind which enables them to enjoy those great works with their foot on the hearth, which is the only way to enjoy any work of literature, the number of boys who leave the great public and secondary schools with that amount of knowledge is a very, very small percentage. You cannot keep up a system of education for a very, very small percentage; and, if that is the only defence of classical education, I think it will have to be abandoned except for the few who are qualified to derive all the immense advantages which to the few they are capable of imparting. But when I turn to the other side and ask what the substitute is, then I confess I am even less happy than when I consider the classical ideal; for I am quite sure—no, I am not quite sure, but I think—you will never find science a good medium for conveying education to classes of forty or fifty boys who do not care a farthing about the world they live in except in so far as it concerns the cricket field, or the football field, or the river—you will never make science a good medium of education for those boys; for only a few are capable at that age, and perhaps at any age, of learning all the lessons which science is capable of teaching. I go further. I never have been able to see, so far as I am concerned, how you are going to get that supply of science teachers for secondary schools who have both the time to keep themselves abreast of the ever changing aspects of modern science and to do all the important work which the English schoolmaster has to do, which is that not simply of teaching classes, but of influencing a house and impressing moral and intellectual characteristics on those committed to his charge.

I do not know whether it was Lord Kelvin's presence which inspired me to say something which I was afraid he would not like. I did not mean to deal with this topic at any length. I only meant to say that while, as far as I am concerned, I think we have not yet arrived at the ideal system or the ideal character of our secondary and public school education, I do think that, so far as this assembly is concerned and the universities are concerned, we are on much more solid ground when we come to the education with which they have got to deal; and especially and chiefly do I say that we are on absolutely secure ground when we are dealing with that post-graduate education which, I hope, will be the great practical result, or one of the great practical results, of the meeting which I am addressing to-night. We know exactly what we want when dealing with post-graduate education, and it is our business to see that the students who desire it have it, and that the opportunity of those who do desire it is augmented so far as our influence will go. I daresay that many of us have looked back with a certain regret, and a certain feeling of shame, to the medieval passion for learning without fee and without reward—with no desire to make the universities stepping-stones to good places or to successful mercantile or industrial undertakings—but with an ideal which made thousands of students from every country in Europe undergo hardships which would be regarded in these softer days as absolutely intolerable, for the sole purpose of seeking, and it might be finding, the great secret of knowledge. We despise, and we perhaps rightly despise, their methods. We know that they were not in touch with the actual realities of the world in which they lived. Yet, after all, we have something to learn from them; and if we in these days could imitate their disinterested passion for knowing and for extending the bounds of knowledge, surely we, with our better methods, and our clearer appreciation of what we can know and what we cannot know, might accomplish things as yet undreamed of. Now, what did they do? They moved from university to university, from Oxford to Paris, from Paris to Padua, from country to country, in order that they might sit at the feet of some great master of learning, some great teacher who might lead their thoughts into undreamed of paths. I hope that in the universities of the future every great teacher will attract to himself from other universities students who may catch his spirit—young men who may be guided by him in the paths of scientific fame; men who may come to him from north or from south; and who, whether they come from the narrow bounds of this island or from the furthest verge of the Empire, may feel that they have always open to them the best that the Empire can afford, and that within the Empire they can find some man of original genius and great teaching gifts who may spread the light of knowledge and further the cause of research.

I have said that they were to find this—I have suggested, at all events, that they should find this—within the limits of the Empire. I hope that in putting it that way I have not spoken any treason against the universality of learning or the cosmopolitan character of science. I quite agree that the discoveries made in one university or by one investigator are at once the common property of the world; and we all rejoice that it is so. No jealous tariffs stand between the free communication of ideas. And surely we may be happy that that is the fact. And yet, though knowledge is cosmopolitan, though science knows no country and is moved by no passion—not even the noblest passion of patriotism—still I do think that in the methods and machinery of imparting knowledge, as there always has been in modern times, so there may still continue to be some national differentiation in the character of our universities, something in our great centres of knowledge which reflects the national character and suits the individual feeling, and that an English-speaking student and a citizen of the Empire, from whatever part of the world he may hail, ought to find something equally suited to him as a student, and more congenial to him as a man, in some university within the ample bounds of the Empire. If that be our ideal, we have to ask ourselves whether we have accomplished it, or whether we are in process of accomplishing it. I am afraid it is too clear that we have not accomplished it. But that we are in process of accomplishing it, and that we can accomplish it—of that I do not entertain the smallest doubt. The movement which has begun with the inter-university meeting, of which this is the culmination, that movement is not destined to finish with this evening's proceedings. It is but the beginning and the seed of far greater things. And I feel confident that, if the representative men whom I see here gathered together from all parts of the world should by good fortune meet a few years hence in this metropolis of the Empire, they will be able to say, and to say with confidence, that the work begun to-night has not been unfruitful; that the machinery for interchanging ideas between our great academic centres has worked admirable good, not merely for the individual student, and not merely for the cause of knowledge, but for the cause of Empire itself. And while learning ought never to be perverted to the cause of faction, or to the cause of separation between the different sections of mankind, yet nevertheless it will be true that this intercommunication of the highest thoughts between the leaders of academic training in every portion of the Empire to which we belong will have furthered not merely sound learning, but sound patriotism. It is in that faith that I have been proud to share, however humbly, the work on which you are engaged. It is this, I think, that will make memorable in academic history the undertaking which my friend, Sir Gilbert Parker, more, perhaps, than any man in this room, has set himself to accomplish; and it is in the cause of education, of learning, of research, of science, and of Empire that I now ask you to fill your glasses and drink to the toast of the universities of the King's over-sea dominions.

NOTES.

IT is proposed to change the name of the Jenner Institute of Preventive Medicine to the Lister Institute of Preventive Medicine. A memorandum which has been sent by the governing body to the members of the institute states as one reason for the change of name that there is in London a commercial firm trading under the name of "The Jenner Institute for Calf Lymph," with a prior legal claim to the name of Jenner Institute. So great has the inconvenience become on account of the confusion between the two institutes, that the governing body has determined to seek the sanction of their members and of the Board of Trade to change the name of the institute to the Lister

Institute of Preventive Medicine, though it is only fair to Lord Lister to say that this name was chosen by his colleagues against his own strong personal wish.

AT a meeting of the Wilts County Council last week, it was decided not to take over the powers and duties of the Amesbury Rural District Council in regard to the alleged rights of way to Stonehenge. Steps are being taken to ensure that the question of right of way shall be brought before a legal tribunal for decision, as the negotiations between the Government and the landowner for the purchase of Stonehenge have come to an end.

THE *Times* correspondent at Cape Town reports that on July 9 a slight earthquake was felt there at 11.37 a.m., followed by a second shock at 12.6 a.m., the latter being the heaviest known at Cape Town for twenty years. No damage was caused.

IT is proposed to hold an International Exhibition at Manchester in 1905. At a meeting recently held in that city, a committee was appointed to take such steps as they consider necessary to ascertain the views of those likely to be interested in such a project.

IN reply to a question asked in the House of Commons on July 8, Mr. Balfour stated that the King had expressed the wish that the Celtic gold ornaments declared by the judgment in the Court of Chancery to be treasure trove, and therefore the property of the Crown, should be presented as a free gift to the treasurer of the Irish Academy. The ornaments will therefore be taken from the British Museum and sent to Ireland.

THE whaler *Terra Nova* has been bought by the Admiralty to be sent to the relief of the *Discovery* in the Antarctic. The *Terra Nova* left St. John's for the Tay on July 9, and is to be fitted out, by instructions of the Admiralty, by the Dundee Shipbuilders' Company, who constructed the *Discovery*.

A PARIS correspondent writes:—Last week a visit was paid to the Moisson Aërodrome by the scientific committee of the Aëro Club, when the Lebaudy balloon made a successful performance, controlled by M. Juchmès and two assistants. During about twenty minutes the balloon travelled at an altitude of about 300 metres, and travelled in different directions for about a kilometre, in spite of a wind blowing at a measured rate of 6 to 7 metres in a second. The influence of the motion of the air was perceptible only by a great diminution of this velocity and large vibrations testifying to the effort exerted.

AMONG the subjects of resolutions adopted in general conference of the International Fire Prevention Congress, held in London last week, the following are of interest:—that in all reports dealing with questions of fire-resistance and tests, the metric system of measurement, weight, and temperature shall be adopted, as well as any local system; that there should be established testing stations for fire-resisting materials, and a universally recognised method of testing adopted; that courses of study should be provided in universities, technical colleges and schools, for the instruction of engineering and architectural students in the fire-resistance of building materials and the methods of construction as based on investigation; that having regard to the neglect of precautions against damage caused by lightning, the subject should have the serious consideration of the Government and local authorities, the technical professions, and the fire service.

MR. H. C. RICHMOND, of Southport, appreciating the highly interesting work of Jeremiah Horrox, is endeavouring to have erected to his memory some suitable memorial in Southport. Doubtless Mr. Richmond feels that the forthcoming meeting of the British Association in that town will awaken some scientific interest, and make easier the task to which he has applied himself. We can wish him all success in his praiseworthy effort to keep alive the memory of one whose genius has been the admiration of successive generations, and whose early death lent a pathetic interest to his work. Already a suitable tablet to the memory of Horrox exists in the Church of S. Michael in Liverpool, a window and memorial chapel commemorate his scientific zeal in the church at Hoole, and on the walls of Westminster Abbey there is other acknowledgment. Is another tablet precisely the form which the memorial should take? It would be just as fitting, and productive of more lasting benefit to the community, to found a Horrox scholarship for astronomy in the new University of Liverpool.

DR. E. C. HOVEY gives reasons in *Science* why the now celebrated volcano on the island of Martinique should be called by the French name Mont Pelé, and not the Anglicised Mount Pelee, in which there is little suggestion of the true pronunciation of the name.

MR. WALTER ROSENHAIN has sent a reprint of a paper read before the Optical Society of London on June 15, on some properties of glass. It deals with the crystallisation of glass due to heating, the effect of light on the colour of glass, the chemical instability of many of the most desirable optical glasses, and the thermal properties of glass, with especial reference to production of internal strains.

M. F. WORMS DE ROMILLY, whose funeral took place on May 3, has bequeathed to the French Physical Society a sum of 150,000 francs, together with his library and the whole of his apparatus. His telescope, the silvered glass mirror of which was made by Léon Foucault, is either to remain the property of the society or to be given to the National Observatory.

THE electrophorus is such a convenient apparatus for producing electricity for class experiments that the unsatisfactory explanations of its action given in many text-books are to be regretted. Dr. Otto Geschöser, in the *Beitrage* of the Oels Gymnasium, describes simple experiments tending to show that the action of the electrophorus is to be attributed to "electromotive force of contact" between the resin disc and the metal plate, and that, so far from these acting as the plates of a condenser, the efficiency of the apparatus depends on the perfection of the contact between them. A modified form of electrophorus, in which the contact is made between silvered glass as a dielectric and copper as a conductor, is described.

THE *Bulletin* of the French Physical Society announces the opening of the new Laboratoire d'Essais du Conservatoire des Arts et Métiers. This laboratory has been founded with the assistance of considerable endowments from the Chamber of Commerce, for the purpose of undertaking measurements and determinations for commercial purposes. It consists of five sections, namely, physics, metals, building materials, machines, and vegetable products. M. Perot is director of the laboratory, and M. Raveau head of the physical department. Among other objects of the laboratory may be mentioned the testing of thermometers, and the standardisation of weights and measures where great precision is not required.

IN the *Proceedings* of the Royal Philosophical Society of Glasgow, Mr. R. F. Muirhead discusses a generalisation of Lord Kelvin's statement of the formula for direct refrac-

tion through a thin lens depending on the introduction of the term "divergence." Mr. Muirhead defines the *divergence* of a pencil of rays with regard to a refracting surface as the reciprocal of the effective distance (*i.e.* actual distance ÷ refractive index) of the surface from the apex of the pencil, and the divergivity of the surface as the divergence it produces on a pencil of rays originally parallel. Lord Kelvin's rule that "divergence after refraction equals divergence before refraction plus divergivity" then applies to refractions at single surfaces, and not merely to thin lenses in air.

SEVERAL articles on the subject of aërial navigation have lately reached us. Early in the year M. W. de Fonvielle discussed the general problem in the *Revue des deux Mondes*, with especial reference to the Bradsky disaster of October, 1902, and urged the desirability of not abandoning ordinary balloon experiments in favour of attempts with motor-driven balloons. In *Cosmos* for May 23, Lieut.-Colonel G. Espitalier gave an account of the new German balloon station at Renickendorf West, the installation of which includes a hangar 50 metres long, 25 metres wide, and 20·5 metres high. Finally, we have before us a paper by Mr. W. Rickmer Rickmers, entitled "Die Beherrschung der Luft" (Vienna), in which the author condemns as contrary to natural laws the attempts made to navigate the air by mechanically propelled balloons.

PROF. J. HANN presented to the Vienna Academy of Sciences on April 2 a treatise on the air-currents at the summit of the Säntis (2504 metres) and their yearly period. The investigation is based upon the anemometrical observations for fifteen years, and the author has calculated the values of the four wind components for each month, and separately for three five-yearly periods. It was satisfactory to find a considerable agreement of the yearly period of the components in each of the three lustra. The northerly component attains its greatest value in January and February, and its smallest value in July and August. The easterly component has nearly the same yearly period as the northerly, but the maximum in winter is more pronounced, and the minimum is from June to September. The contrast between the winter and summer half-year is very marked. The southerly component has a still more marked yearly range, with a maximum in October and November, and a minimum in June. The yearly period of the westerly component is less regular, but there is a decided maximum in July and August, and a similar minimum in April and especially in May. Among other interesting problems the author also endeavours to trace the relations between this yearly variation of the wind components and the distribution of air-pressure at sea-level. These are, on the whole, well marked, so that the distribution of pressure at a height of a mile and a half cannot differ much from that at the sea-level. The S.-N. component reaches its smallest value in May and its greatest in October; the W.-E. component has also its minimum in May, but its maximum in July and August. The resultant is W. 29° S., and varies but little during the year.

DR. J. W. KIME, in an article contributed to the *Scientific American* of June 20, gives details of some experiments that show that sunlight will penetrate in a comparatively short time through a considerable thickness of flesh. He bound together a small negative and a gelatino-bromide plate of the ordinary kind (that is, not specially sensitised for colour) and put the combination between the teeth and the cheek of the subject, taking suitable precautions that no light should enter at the mouth. The cheek was then exposed to direct sunshine in February for forty seconds, and in every case it proved that the image was developable. Reproductions of the results of five experiments are shown, each with a different person. One man had a thick, short black beard, and this lessened the exposure effect somewhat. Another was a negro, with a thick, dark cheek; here the diminution in the light transmitted was still more marked. No steps were taken to interfere with the circulation of the blood, and Dr. Kime considers that his experiments show that it is not necessary, as has been stated, to compress the parts to free them from blood as far as possible when light is used as a surgical agent. Dr. Kime also states that his experiments show why red light is valuable in the treatment of small-pox. "They prove that no chemical light of any consequence reaches the patient" when red curtains are fixed over the windows, &c., and so irritation is prevented and subsequent disfigurement lessened. But as the photographic plates used were not sensitive to red light, the soundness of this deduction from the experimental results may be doubted.

IT is stated that the radium rays have been successfully applied in the treatment of a case of cancer by Prof. Gussenbauer, of Vienna. The tumour completely disappeared as a result of the application, radium bromide being made use of as a source of the rays. The early publication of these details in the public Press before there has been time to test the method effectually is much to be deprecated.

PROF. FINSEN, of Copenhagen, in a note upon the light treatment of lupus (*Acad. des Sciences*, Paris, June 22), points out that it is necessary to employ light of the greatest intensity in order to obtain penetration of the tissues, and states that his results have been much better since employing arc lamps, using a current of 60–80 amperes, than previously with 40 ampere lamps, the former penetrating in 20–25 seconds to a depth which formerly occupied 4–5 minutes.

DRS. DUTTON AND TODD, of the Liverpool Trypanosoma Expedition to Gambia, have just returned to England. They state that the disease occurs frequently both in natives and Europeans, and that it is distributed from the sea to the Upper Gambia. Besides the human disease, there is also an affection of the horse in the same region, caused by a trypanosoma, and resembling somewhat the "tse-tse" fly disease, but being more chronic. This is in all probability a disease distinct from the "tse-tse" fly disease. A mass of material has been brought home which will necessitate some time to work through.

MR. B. TIMOTHY sends us from Waterford an abnormal corolla formed by the union of several flowers, found growing on the apex of the stem of a foxglove, and surrounding the stem entirely. A botanist to whom we submitted the specimen remarks in reply that this abnormal development of a foxglove is "a case of *peloria*, that is, a change or revision from an irregular to a regular condition of the flower; in this instance there is an additional abnormality, since the pistil has proliferated, *i.e.* instead of carpels an inner flower has been formed which bears stamens, but inside the carpels again have produced vegetative structures, the bracts."

A FINE sample of the Okapi (*Ocapia johnstoni*) has recently been acquired by the Hon. Walter Rothschild for his collection at Tring. The modelling has been entrusted to Mr. Rowland Ward.

IN vol. lxxiv. part iii. of the *Zeitschrift für wissenschaftliche Zoologie*, Mr. R. Weinberg publishes the first of a series of articles on the brains of fossil vertebrates, dealing in this case with the small Tertiary perissodactyle

Anchilophus desmaresti. The brain of this mammal, it appears, although essentially primitive, exhibits all the characteristic ungulate features, with a marked approximation towards the modern perissodactyle type.

To the June number of the *Zoologist* Mr. Lydekker contributes a note on the probable use of the bilobed canine tooth of the giraffe and its allies, which forms the outermost of the four pairs of lower front teeth. It has been observed that, when browsing, a giraffe (unlike a deer or an antelope) strips the leaves from the branches without biting off the twigs, and it is inferred that the complex structure of the canine is designed to aid in this "combing" action.

THE June issue of the *Economic Proceedings* of the Royal Dublin Society is devoted to an account, by Mr. G. H. Carpenter, of injurious insects and other animals observed in Ireland during 1902. Special interest attaches to two excellent illustrations, one showing the caterpillar of the ghost swift moth (*Hepialus humuli*) feeding on the roots of wheat, and the other the injury done to young wheat by the maggot of the wheat-bulb fly (*Hylemyia coarctata*). Reference is made to the new fern-weevil (*Syagrius intrudens*) recently described by Mr. Waterhouse on the evidence of imported specimens found in the fern-houses at the Royal Botanic Gardens, Glasnevin.

THE Cairo Survey Department has recently published a preliminary description, by Messrs. Andrews and Beadnell, of the remains of a giant land tortoise (*Testudo ammon*) from the Eocene of the Fayum district. The especial interest of this form is its antiquity, which far exceeds that of all other known members of the group. Dr. Andrews thinks it probable that *T. ammon* is the ancestral form of the giant tortoises met with in several European Tertiary horizons, and that the existing African *T. pardalis* may be a small survivor of the group, to which the Siwalik *T. atlas* and *T. cautleyi*, and the existing *T. sumeirei* (the well-known giant tortoise of Port Louis) may also pertain.

IN the current number of the *Zeitschrift für physikalische Chemie* Prof. F. Kohlrausch gives a summary of the work which he has carried out during the last thirteen years on the electrical conductivity of saturated solutions of slightly soluble salts. In all forty-one such salts have been investigated, and the electrical conductivities determined at different temperatures. The data are to be used for the calculation of the solubilities of the various salts, and the numbers, which must be of considerable value to the analytical chemist, are to appear in a later paper.

THE results of a careful investigation by Dr. Freundlich on the precipitation of colloidal solutions by electrolytes are published in the current number of the *Zeitschrift für physikalische Chemie*. The capacity of different electrolytes for precipitating the colloids is dependent, in a large measure, on the valency of the ions, this capacity increasing with increase of valency. For colloids which show anodic convection under the influence of an electric current, the nature of the anion is without influence, whilst for those which exhibit kathodic convection the precipitation is independent of the nature of the cation.

AN interesting account of the behaviour of chlorine towards benzene under the influence of various catalytic agents is given by Mr. Slator in the *Journal* of the Chemical Society. With iodine chloride as catalytic agent, about 70 per cent. of the reacting chlorine is used up in the production of chlorobenzene, while the remaining 30 per cent. disappears in the formation of the addition compound benzene hexachloride. When tin tetrachloride and ferric chloride are employed as catalysers, the whole of the chlorine is used up in the substitution reaction. On the other hand, when chlorine interacts with benzene under the influence of light, addition only takes place.

FOR many years past it has been the practice of the Iron and Steel Institute to republish from time to time rare and interesting papers relating to the history and manufacture of iron and steel. With the permission of the council of the British Association, the institute has now added to the series the report presented by Bunsen and Playfair to the British Association at Cambridge in 1845, on "The Gases Evolved from Iron Furnaces, with Reference to the Theory of the Smelting of Iron." This research has long been looked upon as a model of the application of the methods of scientific investigation to the elucidation of industrial problems.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Miss Gayner Rowland; two Bristly Ground Squirrels (*Xerus capensis*) from South Africa, presented by Mr. H. J. Palmer; a Ruddy Ground Squirrel (*Xerus rutilus*) from Burao, East Africa, presented by Mr. Bennett Burleigh; a Brazilian Tapir (*Tapirus americanus*), a Red Brocket (*Cariacus rufus*) from Manáos, Brazil, presented by Mr. Charles Booth; a Grand Galago (*Galago crassicaudata*) from East Africa, presented by Captain C. Mylton Thornycroft; three Fat-tailed Desert Mice (*Pachyuromys dupresi*) from Egypt, presented by Dr. H. P. Keatinge; an Undulated Grass Parrakeet (*Melopsittacus undulatus*) from Australia, a Goldfinch (*Carduelis elegans*), European; a Red-bellied Waxbill (*Estrelda rubiventris*) from West Africa, a Yellow-bellied Liothrix (*Liothrix luteus*) from India, presented by Mrs. Halsey Ralph Ricardo; a Punjaub Sheep (*Ovis cycloceros*) from North-west India, two White-necked Cranes (*Anthropoides leucachen*) from Japan, four Demoiselle Cranes (*Anthropoides virgo*) from North Africa, purchased; a Burrhel Sheep (*Ovis burrhel*), a Sambur Deer (*Cervus aristotelis*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

COMET 1903 *c*.—A new ephemeris, calculated from new elements by Herr M. Ebell, is given in Kiel *Circular* No. 62. It extends to a later date than the one previously published by M. Fayet, and also varies slightly from that one. The following data are given for the four last dates included in the new ephemeris:—

Ephemeris 12*h*. (*M.T. Berlin*).

1903	α h. m. s.	δ ° ′	log Δ	Brightness
July 17	18 41 11	+62 2·2	9·4324	14·6
,, 19	17 7 44	+67 35·1	9·4553	14·2
,, 21	15 22 3	+68 36·0	9·4906	13·1
,, 23	13 59 5	+66 17·8	9·5327	11·7

The following observations of this comet are recorded in No. 3882 of the *Astronomische Nachrichten*.

Dr. Meyermann, using the Kreutz micrometer on a 6-inch comet-seeker, and Prof. Ambronn, with the Repsold heliometer, record that on June 23 the comet was 2′ in diameter and had a faint tail, whilst for June 24 the latter observer records that in difficult "seeing" a faint tail extending towards the south was seen.

Prof. Hartwig, using the Bamberg heliometer, records that on June 23 the nucleus was between the tenth and eleventh magnitudes, and the tail was of the divided form, having a mean position angle of 250°, whilst the coma was about 10′ in diameter.

Prof. Millosevich, observing at Rome with a 39cm. equatorial and a filar micrometer on June 23, recorded a 9·5 magnitude nucleus, and a very short tail, which extended in a S.S.W. direction.